Comments on Draft report on Hoosier Energy- Frank E. Ratts Generating Station

EPA: None

State: None

Company: See attached letter dated January 31, 2011.

HOOSIER ENERGY
RURAL ELECTRIC COOPERATIVE, INC.
A Touchstone Energy® Cooperative

January 31, 3011

Stephen Hoffman
US Environmental Protection Agency (5304P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: AMEC Earth & Environment, Inc., *Draft Report of Dam Safety Assessment of Coal Combustion Surface Impoundments, Hoosier Energy, Frank E. Ratts Generating Station, Petersburg, Indiana*, September 2010.

Dear Mr. Hoffman:

Please find enclosed comments from our consultant, SCS Engineers, on the draft dam safety report prepared by AMEC Earth & Environment, Inc. ("AMEC"). Based on SCS' review of the available data, the AMEC report, and SCS' January 2011 site visit, Hoosier Energy believes that a low hazard potential and fair condition ranking should be assigned to all four ponds. It is unclear if AMEC has reviewed or considered all of the relevant available information necessary to arrive at their specific conclusions. AMEC's checklist forms confirm Hoosier Energy's documentation that Ponds 1, 2, 3 and 4 have not experienced significant seepages in the past. Additionally, Ponds 1, 2 and 4 have not experienced a previous failure. AMEC applied the National Dam Safety Review Board condition assessment definitions in arriving at an overall "poor" rating for the ponds, yet no specific or quantifiable information was provided to justify this rating. In our opinion, a "fair" condition assessment is more appropriate given the ample historical evidence that the ponds are stable in their current configuration and condition.

The "significant" Hazard Potential ranking AMEC assigned to Pond 4 is also unsupported by the facts. AMEC based "significant" hazard ranking on the supposedly close proximity of Pond 4 to White River. However, SCS' examination of aerial photographs and drawings, and January 2011 site visit, demonstrates that Pond 4, Pond 3 and Pond 2 are at relatively similar distances to White River. Since Ponds 2 and 3 were ranked "low" hazard, Pond 4 should not be ranked "significant" based solely on distance to White River. AMEC's evaluation of ½ PMF for stability modeling at Pond 4 was not justified since it would apply only to the rapid-drawdown case, which was shown by previous stability modeling in 2007 to have a Factor of Safety of 1.4 for the 100-year storm. Since the ponds have operated safely and been stable for decades, under a variety of loading conditions, there is little to no justification for using this issue to support a significant hazard rating.

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Finally, as explained in more detail in the enclosed comments, AMEC's recommendations for the focused additional slope stability, hydraulic and hydrologic modeling, and sophisticated monitoring (i.e., inclinometers), to re-confirm pond stability and to protect the environment are unnecessary based on the site's history, geotechnical conditions, and feasibility concerns. Hoosier has engaged in extensive and ongoing studies of the stability and improvement of the Ratts Ash pond. That work is continuing and has resulted in an extensive inspection program that ensures that that the possibility of a failure from these ponds is extremely low and that any corrective measures are taken immediately. This program developed because of a monthly in-house inspection program that looks for conditions of concern. Since the mid 1990's Hoosier Energy has contracted with two different engineering firms to do extensive structural evaluations and inspections of the ponds. All recommendations have been implemented. In addition, a permanent piezometers are in place to assist with the monitoring program and are utilized periodically for monitoring purposes.

Hoosier Energy is perplexed by the poor ratings for this ponds and asks EPA to consider the facts. Given the extensive evidence of an ongoing inspection program (both internal and extermal) and Hoosier's extensive past history of immediate repair when issues are discovered, we consider poor ratings unwarranted. We appreciate your consideration of these facts.

Sincerely,

Michalene Reilly

Michalene Reilly

MR/pjm

Enclosure

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Cc: Robert H. Eisenberg
Michael McLaughlin
John M. Holloway
File R1.26

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SCS ENGINEERS

January 30, 2011
File No. 23210035.02

MEMORANDUM

TO: Michalene Reilly, Hoosier Energy

FROM: Bob Isenberg, PE, CPG
Mike McLaughlin, PE

SUBJECT: Review Comments on Draft AMEC Dam Safety Report
Ratts Generating Station, Petersburg, IN

INTRODUCTION

At the request of Hoosier Energy, SCS Engineers reviewed the draft *"Report of Dam Safety Assessment of Coal Combustion Surface Impoundments, Hoosier Energy, Frank E. Ratts Generating Station, Petersburg, Indiana*, prepared by AMEC Earth & Environment, Inc. for the U.S. EPA Emergency Response Service Center, dated September 2010. We also reviewed a number of supporting documents provided to us by Hoosier Energy that relate to the subject impoundments, most of which were referenced in the AMEC report. On Friday, January 14, 2011, an SCS representative (Randy Mills) toured the site and took photographs of the subject pond structures.

The purpose of our review was to evaluate the draft report by AMEC relating to the pond safety assessments, including AMEC's conclusions and recommendations regarding hazard potential and condition, and to provide comments relative to their findings.

This memorandum summarizes key information contained in AMECs draft report and information provided by Hoosier Energy, includes photographs of each pond from our recent site visit in January 2011, and provides SCS's comments and recommendations relative to the pond safety assessments. Based on our review of the available data, including AMECs report and our recent site visit, SCS believes a **low hazard potential** and **fair condition** are justified for all four ponds**.** These findings are in partial agreement with AMECs assessment, but not completely. Specifically, information relating to Pond 3 supports a "low" hazard potential, rather than "significant.". Additionally, the condition ranking of all four ponds should be characterized as "fair", rather than "poor." We do concur with AMEC's recommendation for continued monitoring of the ponds, coupled with routine maintenance, as requirements for maintaining their current hazard potential and condition assessment. Hoosier Energy has been committed to such routine inspection and maintenance actions since the ponds were first constructed, and which is supported by their Preventative Maintenance Procedure Checklist dating back to 1996, last updated in 2000.

SUMMARY OF DRAFT DAM SAFETY ASSESSMENT REPORT

AMEC was contracted by the USEPA under contract BPA EP09W0010702 to perform assessments of selected coal combustion byproducts surface impoundments, which included Hoosier Energy's Frank E. Ratts Generating Station, near Petersburg, Indiana. The assessment included a visual inspection by two AMEC representatives on August 19, 2010, as well as the collection and review of historical information and documentation. AMEC indicated that their assessment was completed in "general accordance" with FEMA's *Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams,* April 2004. However, AMEC also referenced the Indiana Department of Natural Resources Division of Waters, the Indiana Dam Safety Inspection Manual, US Department of Labor, Mine Safety and Health Administration's Mining Safety and Health Administration (MSHA) Coal Mine Impoundment Inspection and Plan Review Handbook, and completed EPA's Coal Combustion Dam Inspection Checklists and Coal Combustion Waste Impoundment Inspection Forms during their site visit,

The following briefly summarizes key site features described in AMECs report:

- Frank E. Ratts Generating Station was built in the late 1960's and consists of two 125 MW coal burning units.

- Coal combustion wastes (CCW) generated by the plant include bottom ash and fly ash, which are disposed in on-site ponds using wet sluicing methods

- Four ponds exist at the site for CCW, but only two are active; the ponds are currently designated as Pond 1, 2, 3 and 4, but the latter is also referred to as the "Bottom Ash Pond."

- Ponds 2, 3 and 4 were formed by constructing perimeter earthen dams ("diked"), but Pond 1 was created by excavation below original ground ("incised").

    - Pond 1 was commissioned in 1970 and active until 1976
    - Pond 2 was commissioned in 1975 and is inactive
    - Pond 3 was commissioned in 1982 and is inactive
    - Pond 4 was commissioned in 1982 and remains active

- Following hazard classifications of the Indiana Department of Natural Resources (DNR) Division of Water and the Indiana Dam Safety Inspection Manual, dams are generally classified as having "Low", "Significant" or "High" hazard potential.

    - AMEC indicated that all four ponds are <u>not</u> classified by IDNR and based on size and storage capacity are not required by state law to provide hydraulic or hydrologic design for the four ponds, and the state has not inspected these ponds in the past.

- AMEC noted that as defined by the Mine Safety Health Administration (MSHA), and based on AMEC's "low" hazard potential rating, Ponds 1, 2 and 3, should be designed to handle the 100-year storm event of 24 hour duration whereas Pond 4, because of AMECs "significant" hazard potential rating should designed for ½ of the Probable Maximum Flood (PMF).

- On the EPA Coal Combustion Dam Inspection Checklist Forms (which AMEC provided to EPA following the inspections), AMEC listed the hazard potentials as summarized in Table 1 below for each pond (Note: the Reader should refer to AMEC's actual checklist forms for additional details and comments):

Table 1. Summary of Hazard Potential Classifications by AMEC

Pond # and Primary Contents	Hazard Potential Classification	Configuration and Estimated Pool Area	Reasoning for Hazard Rating
1 Bottom Ash	Low*	Incised ~6 acres	Significant distance from White River reduces likelihood of contamination; incised configuration reduces probability of failure and limits extent of environmental impact
2 Fly Ash	Less Than Low	Diked ~10 acres	Significant distance from White River reduces likelihood of contamination; in the event of failure, fly ash would have to flow uphill to reach White River
3 Fly Ash	Less Than Low	Diked ~10 acres	
4 Fly Ash	Significant	Diked ~25 acres	Close proximity to White River increased likelihood of contamination in event of failure

*refer to hazard potential definitions in AMECs report

- It is important to point out that AMECs checklist forms confirm documentation provided by Hoosier Energy that Ponds 1, 2, 3 and 4 have not experienced significant seepages in the past. Additionally, Ponds 1, 2 and 4 have not experienced a previous failure. Only Pond 3 was noted to have experienced a localized breach, which was documented by Fuller, Mossbarger, Scott and May Engineers in a September 22, 2006 report. FMSM reported that a breach occurred at the southeast dike following heavy precipitation that caused water to collect against the dike. This southeast dike location is actually away from the White River and was reportedly caused by piping,

not global slope instability. The breach was repaired shortly thereafter and no similar problems have been documented since that time.

- AMEC assessed the "condition" of each pond based on the National Dam Safety Review Board classifications which include: Satisfactory, Fair, Poor, Unsatisfactory and Not Rated. All four ponds were assigned a "Poor" condition", which was explained in AMECs report as "…due to lack of critical analyses which would verify the units would be stable under required loading conditions. At Pond 4, ½ of the PMP should be used in analyses."

- Various reports and investigations dealing with pond operation, maintenance and repairs were referenced by AMEC as having been completed by independent engineering companies in the past. Following is a partial listing of those efforts:

  - Ash Pond Dike Improvements, Jan 2009, Stantec
  - Ash Pond Erosion Repair Plan and Specifications, July 2008, Stantec
  - 2007 Ash Pond Dike Improvements, Stantec
  - Report on Slope Stability Evaluation, Perimeter Dikes for Ash Pond 003 Ratts Generating Station, January 2007
  - Ratts Generating Station Dike Evaluation, September 2006, FMSM Engineers
  - Frank E. Ratts Generating Station Ash Disposal System Modifications, Site Grading Plan, March 1975, R.W. Beck & Associates
  - Levee Repair, Petersburg Generating Station, August 1997, Koester Contracting Corp.
  - Fly Ash Pond Closure Plan, January 1997, Burns & McDonnell
  - Frank E. Ratts Generating Station Ash Management Plan for Pond Closure, April 1998, Burns & McDonnell
  - Site Observation Trip Coal Ash Storage Pond, August 1997, ATC Associates

- Regarding structural adequacy and stability, AMEC provided minimum factor of safety (FS) criteria recommended by the USACE, MSHA, as well as IDNR, as follows:

Loading Condition	MSHA	USACE	IDNR*
Rapid Drawdown	1.3	1.1 – 1.3	1.1
Long Term Steady Seepage	1.5	1.5	1.5
Earthquake Loading	1.2	----	1.1

*these are the target values used by FMSM

- AMEC also reported on results of slope stability modeling performed by FMSM Engineers for Pond 4 (which was designated as Ash Pond 003 in FMSM's' 2007 report) for cross sections A-A' and B-B' for the three loading conditions noted above. The FS values for these cross-sections met the "target" values that FMSM and IDNR

selected. AMEC did comment that "½ of the PMP flood elevation was not used in the analysis." They recommended the analysis be updated to reflect the ½ PMP level rather than the 100-year flood level used by FMSM.

- In 2007, FMSM inspected the dikes forming the westernmost pond (Pond 4) and reported seeing instability in the form of shallow surface sloughing along the slope faces where the slopes appeared to be steeper, or where groundwater was present near the embankment toe. Some signs of erosion were also noted by FMSM along the ash dike, but not along the outer clay dike

- Figure 3 in AMEC's report is a general site map, although the arrow for the Frank E. Ratts Generating Station appears to point to a different power plant.

- Under Section 5.0 Closing, AMEC notes that "the conclusions and recommendations given in this report are based on visual observations, our partial knowledge of the history of Ratts Generating Station impoundments and information provided to us by others." It is unclear if AMEC has reviewed or considered all of the relevant available information necessary to arrive at their specific conclusions.

PHOTOS FROM JANUARY 14, 2011(BY RANDY MILLS, SCS ENGINEERS)

As part of SCS's evaluation, one of our engineers visited the site on January 14, 2011, toured the subject ponds and met with Hoosier's staff. During this visit, we observed conditions that were consistent with available documents and reports. Photographs taken from that site visit are provided on the following pages.

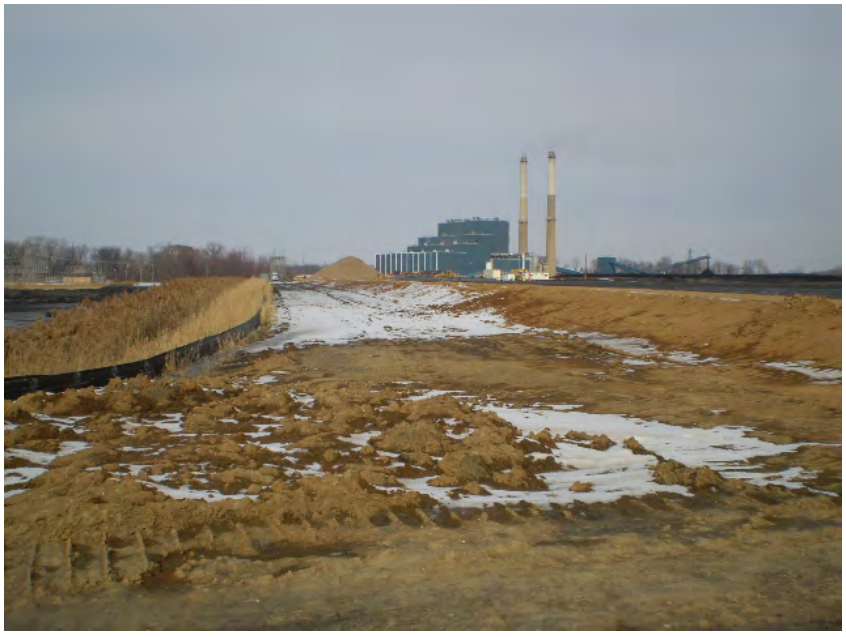

Photo 1: Pond 4 (Fly Ash Pond) Looking North from SE

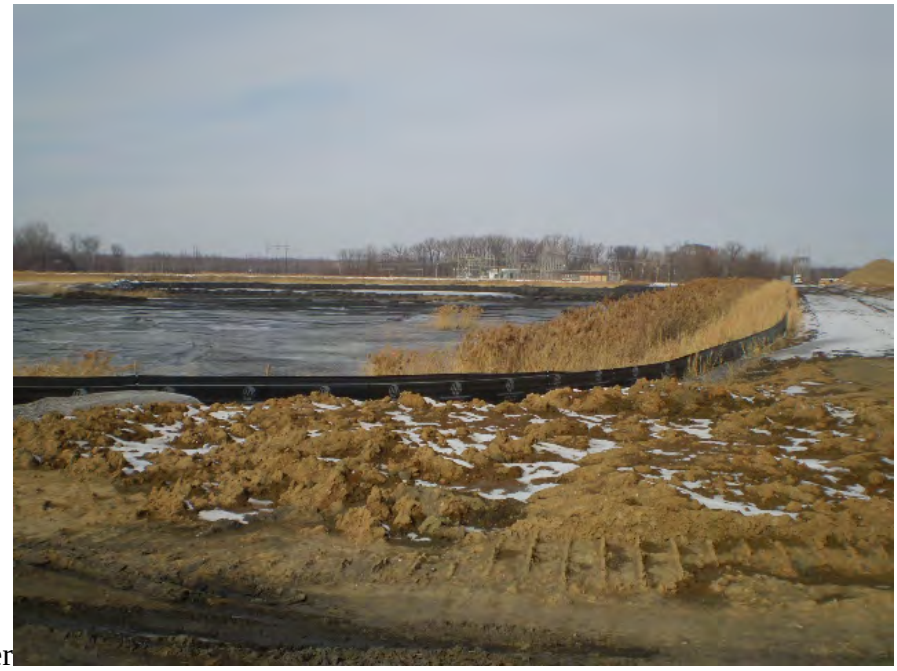

Photo 2: Pond 4 (Fly Ash Pond) Looking Northwest from SE Corner

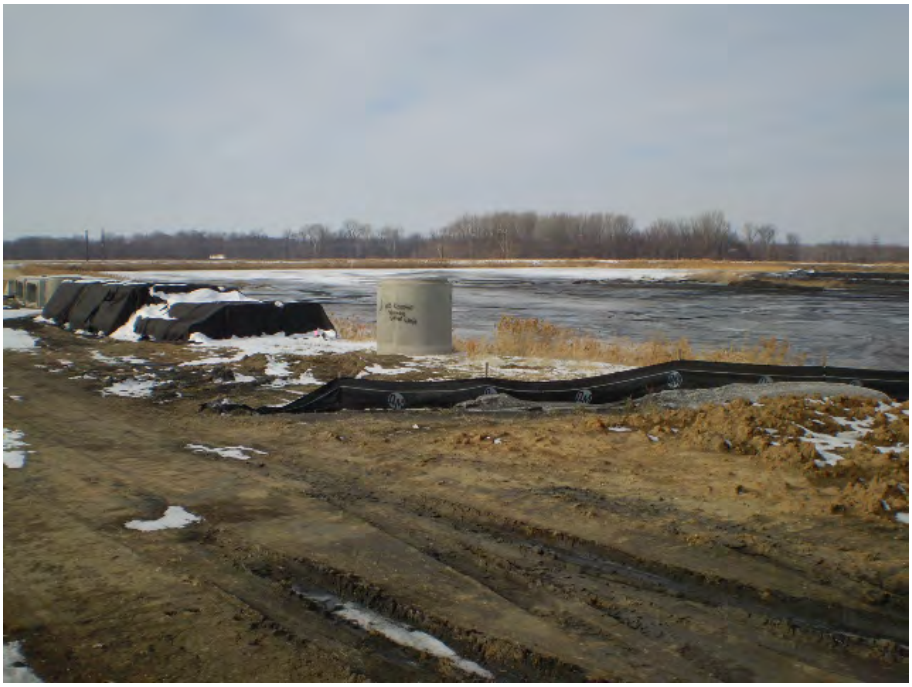

Photo 3: Pond 4 (Fly Ash Pond) Looking Northwest from SE Corner

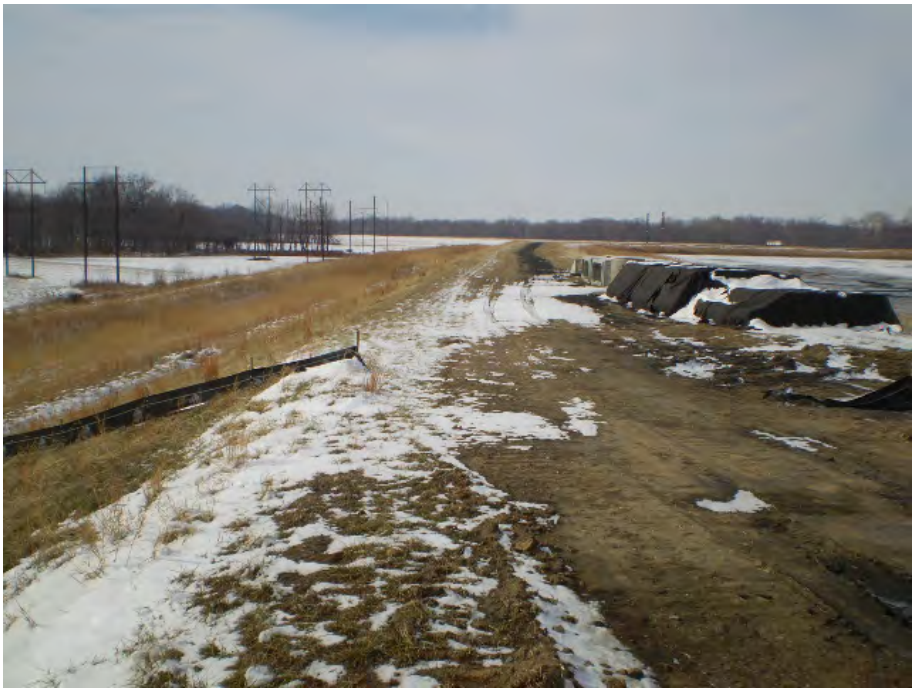

Photo 4: Pond 4 (Fly Ash Pond) Looking West from SE Corner

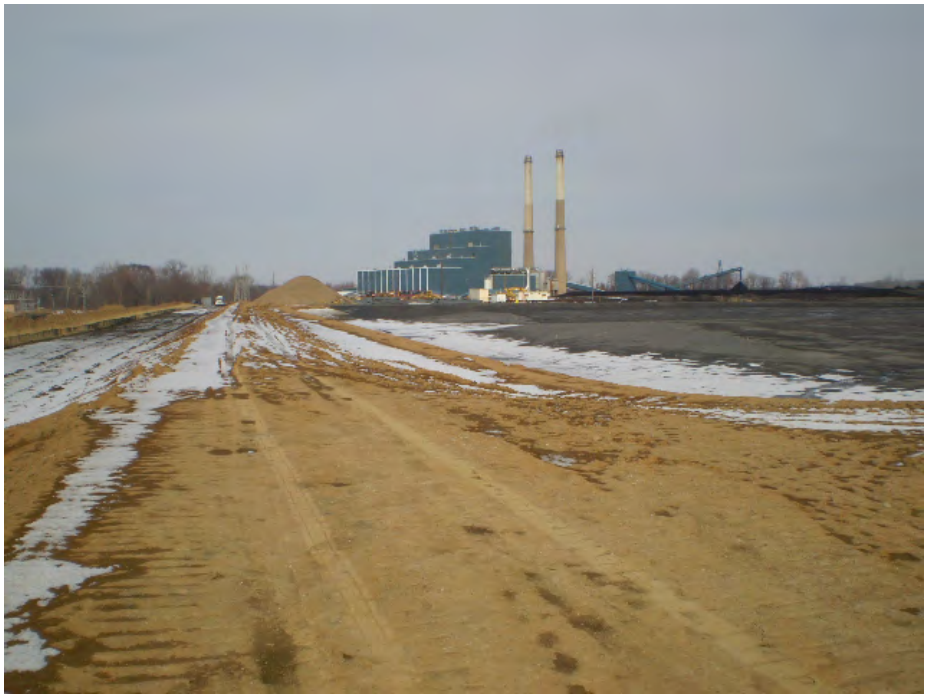

Photo 5: Ponds 2 and 3 Looking North from SE Corner of Pond 4

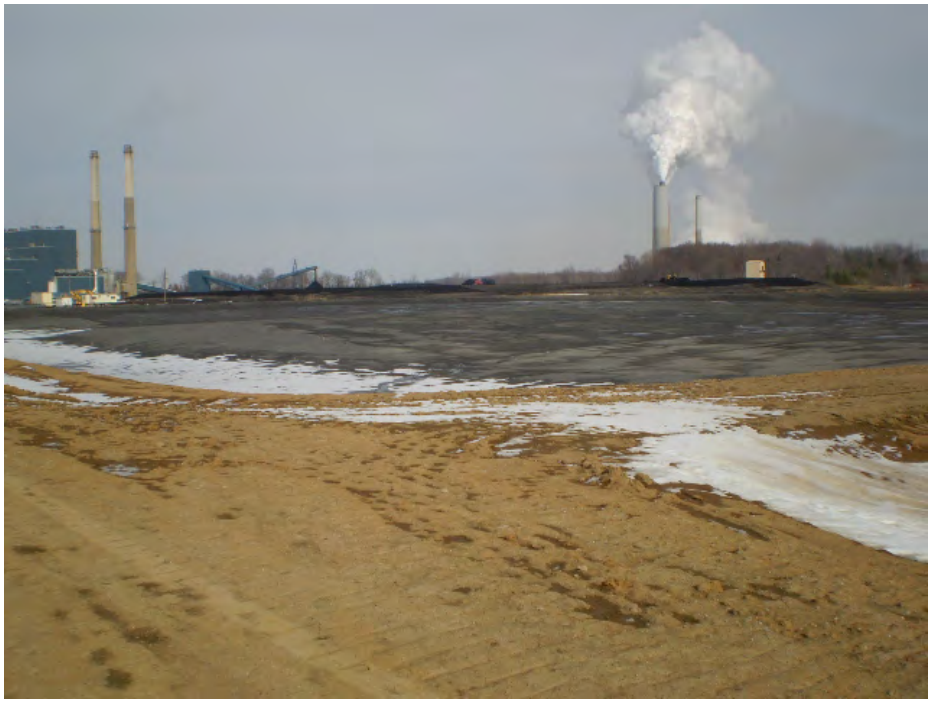

Photo 6: Ponds 2 and 3 Looking Northeast from SE Corner of Pond 4

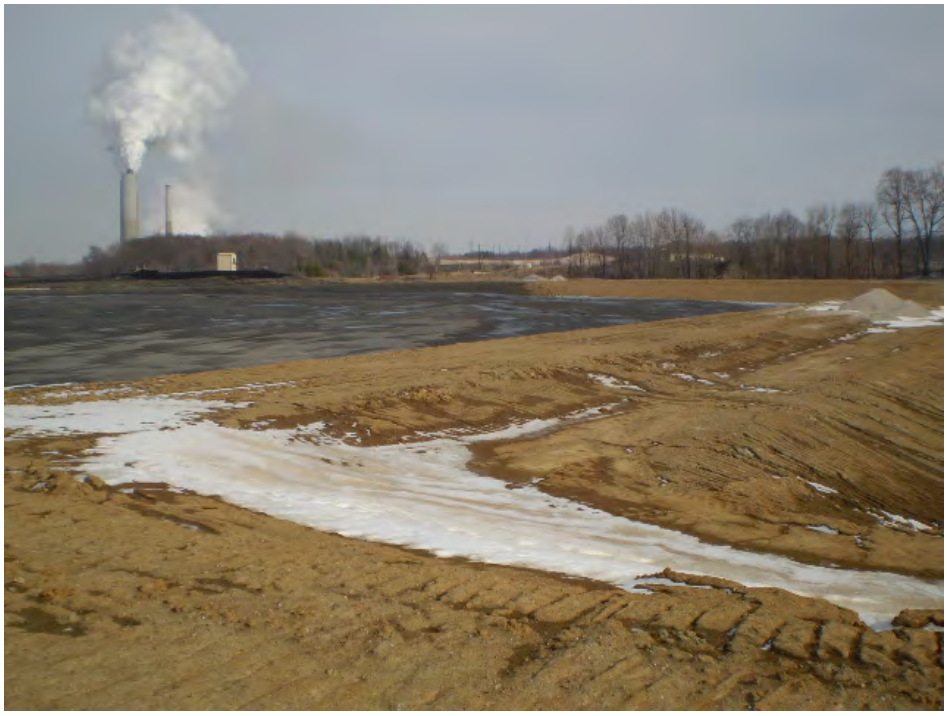

Photo 7: Ponds 2 and 3 Looking Northeast from SE Corner of Pond 4

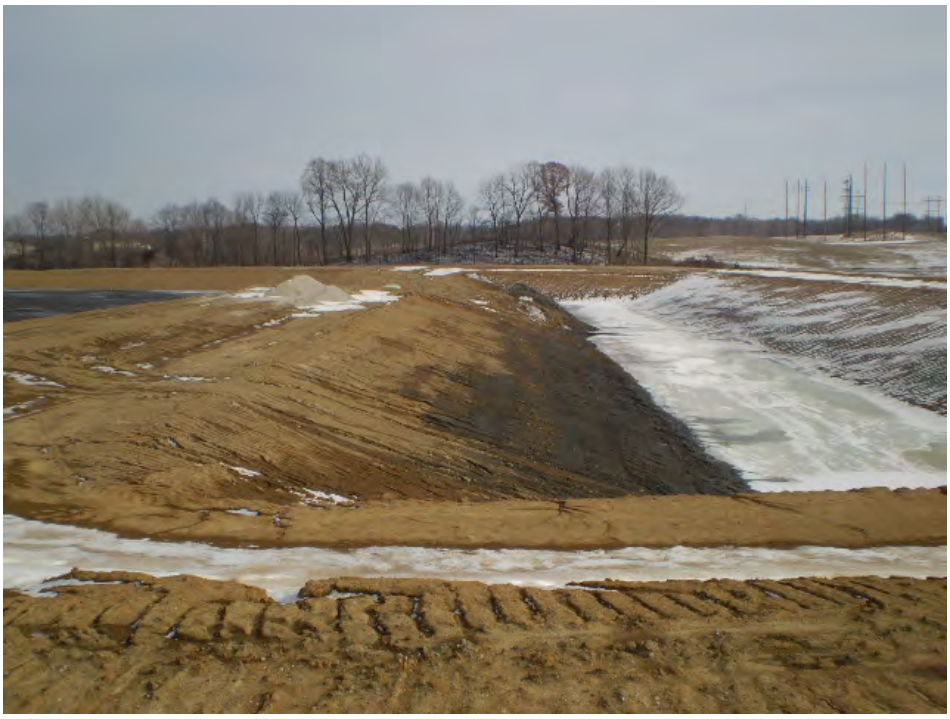

Photo 8: Ponds 2 and 3 Looking East from SE Corner of Pond 4

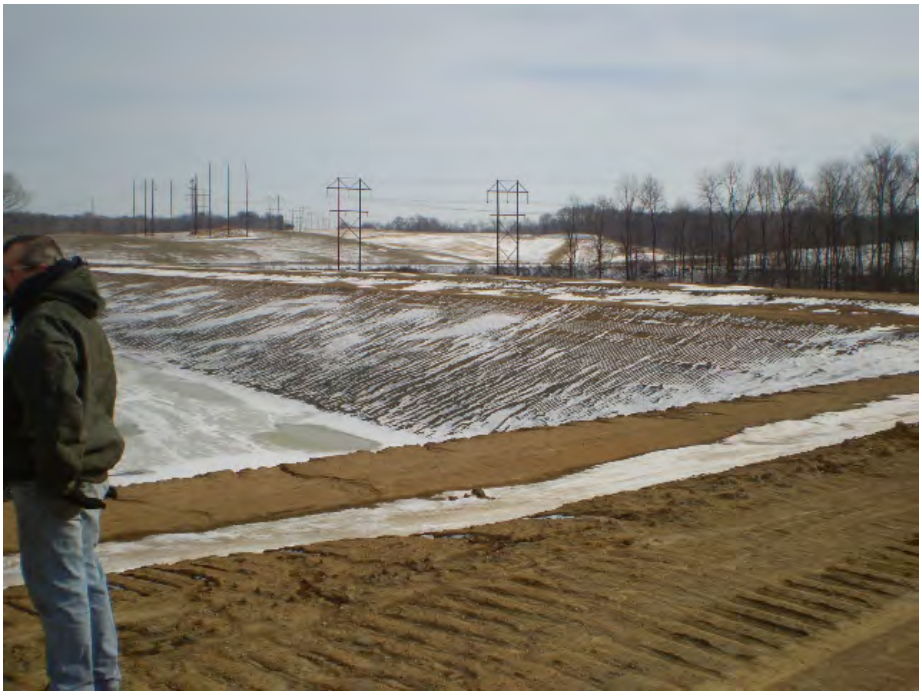

Photo 9: Ponds 2 and 3 Looking Southeast from SE Corner of Pond 4

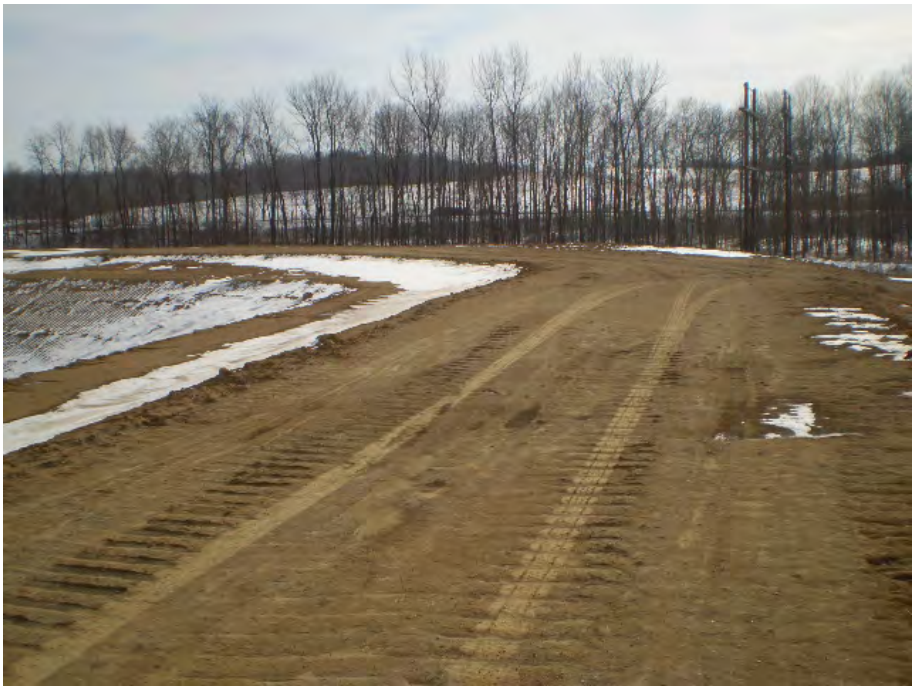

Photo 10: Ponds 2 and 3 Looking East from SE Corner of Pond 4

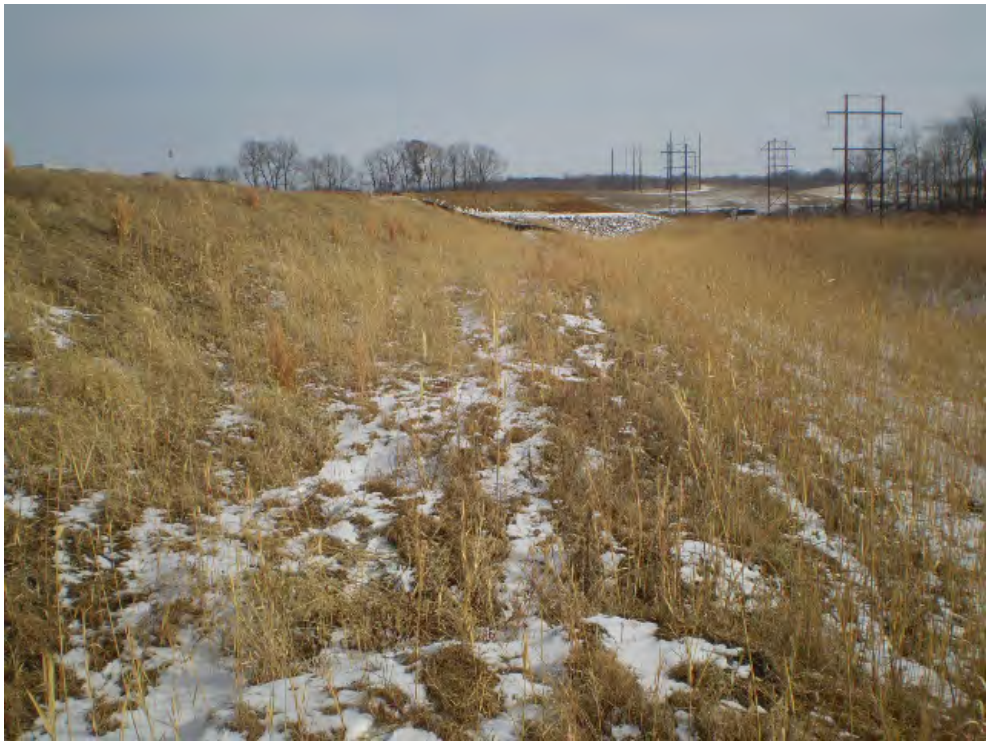

Photo 11: Area Between Inner and Outer Berm Along Southern End of Pond 4 (Looking East)

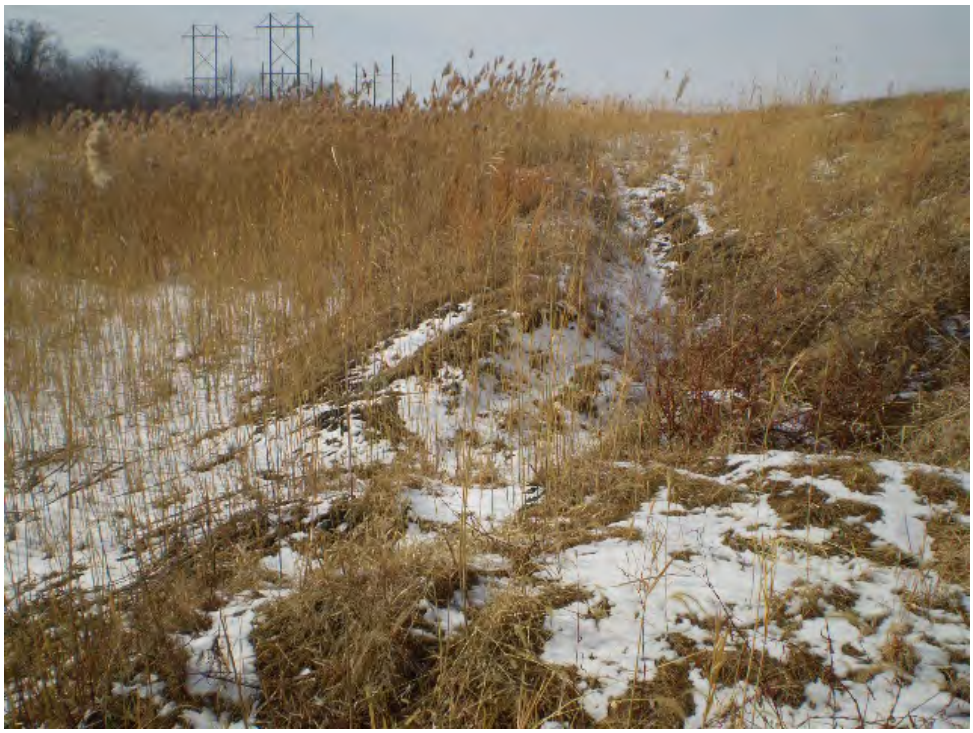

Photo 12: Area Between Inner and Outer Berm Along Southern End of Pond 4 (Looking West)

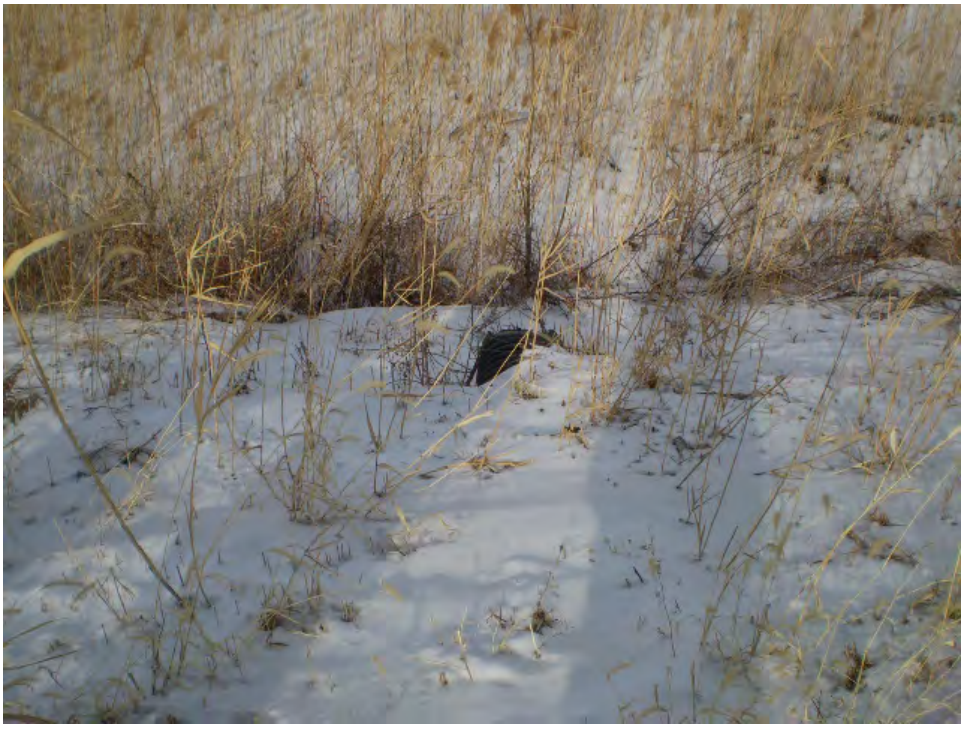

Photo 13: High Discharge Point from Pond 4- Not in Use (Lower Discharge Point in Use)

Photo 14: Pond 4 Looking from SE Corner Toward NE Corner

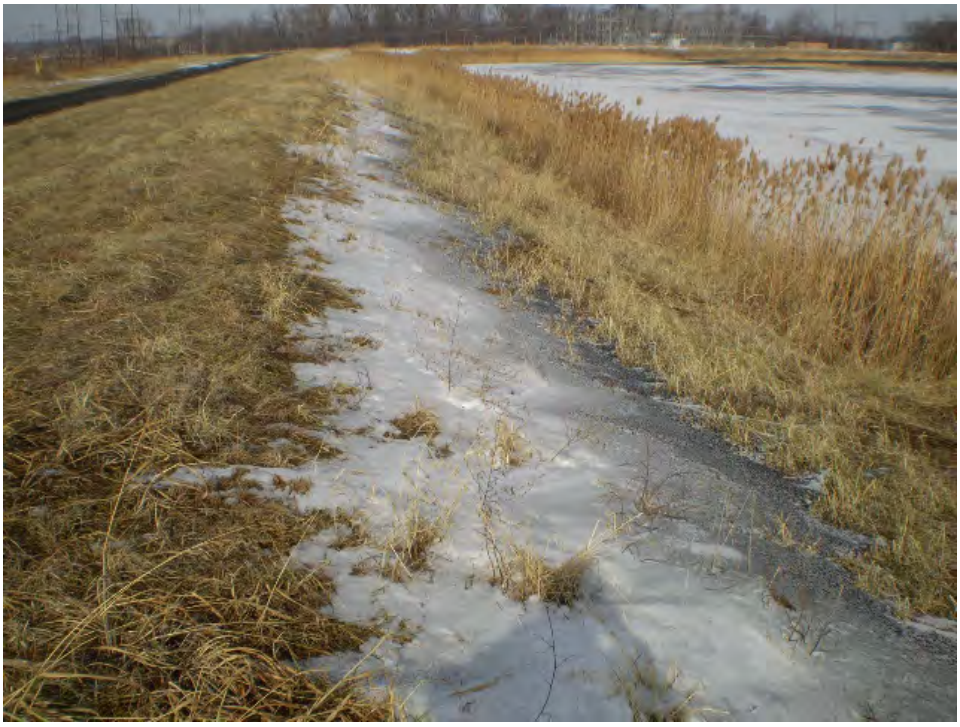

Photo 15: Inner Side of Pond 4 West Inner Berm

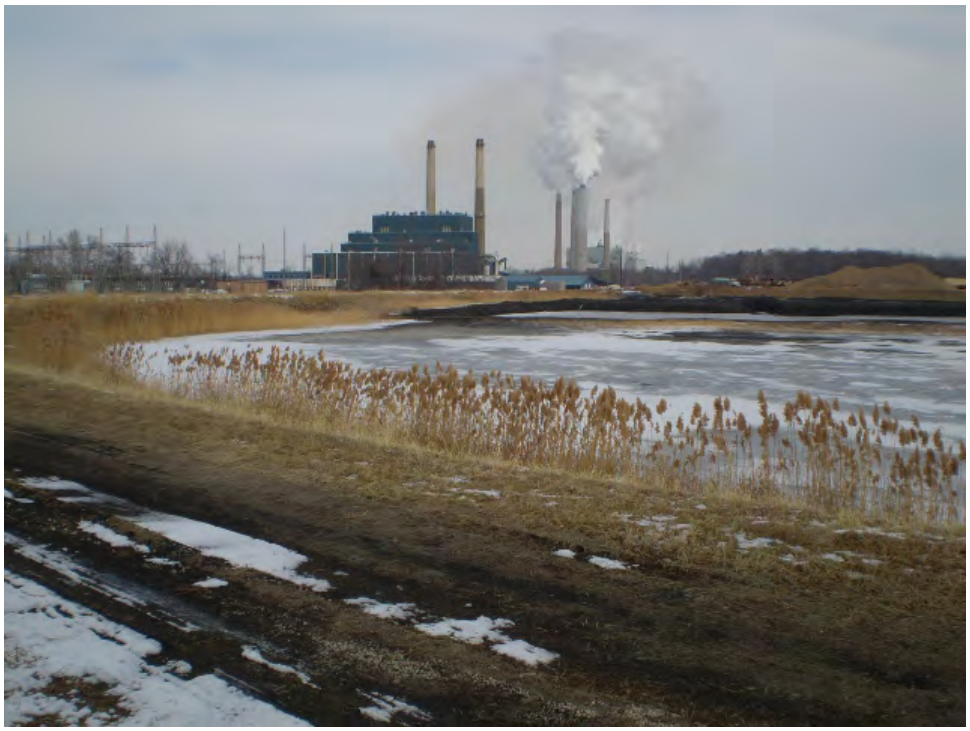

Photo 16: Northeast Corner of Pond 4

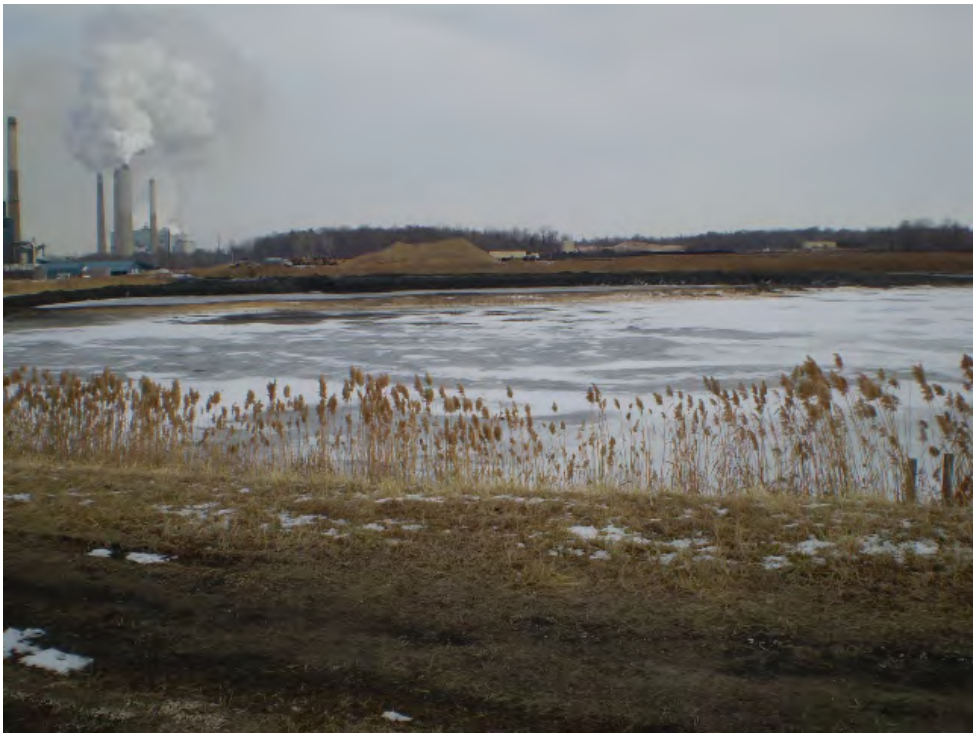

Photo 17: Northeast Corner of Pond 4

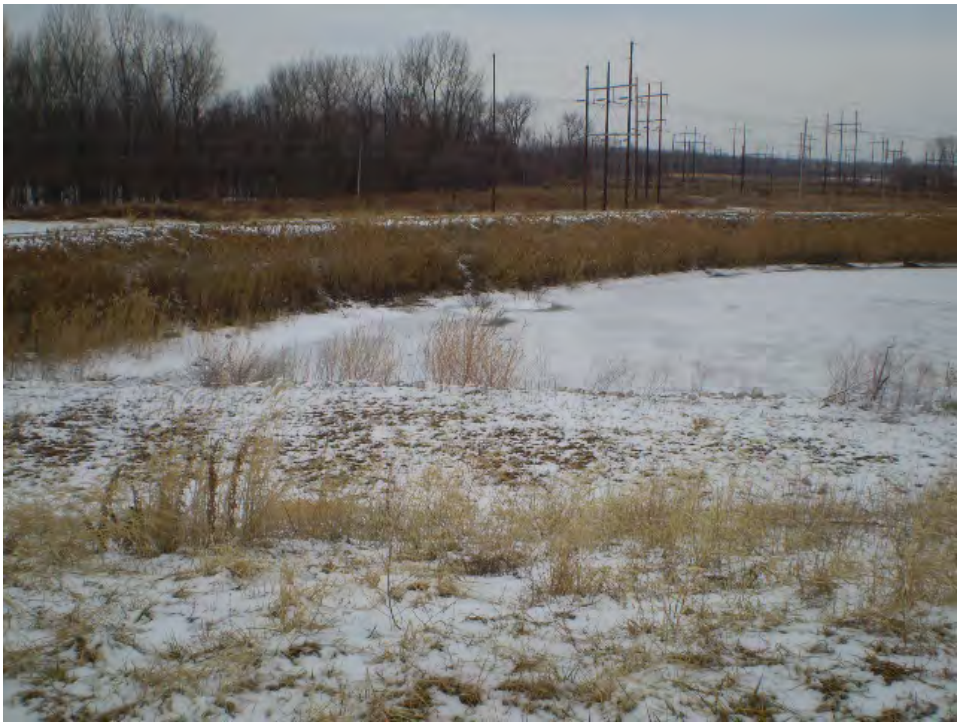

Photo 18: Settling Basin at North End of Pond 4

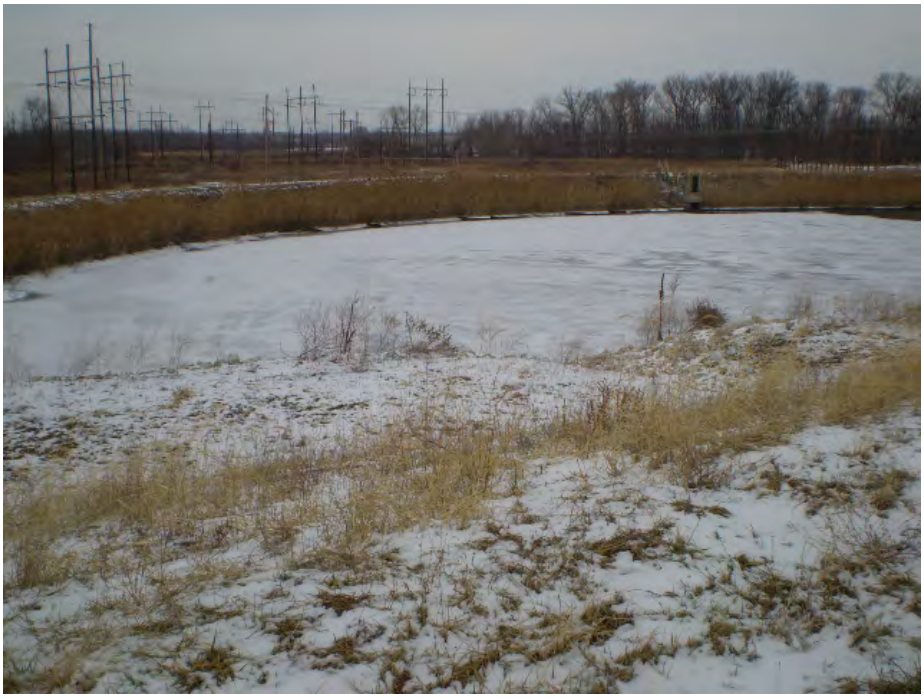

Photo 19: Settling Basin at North End of Pond 4

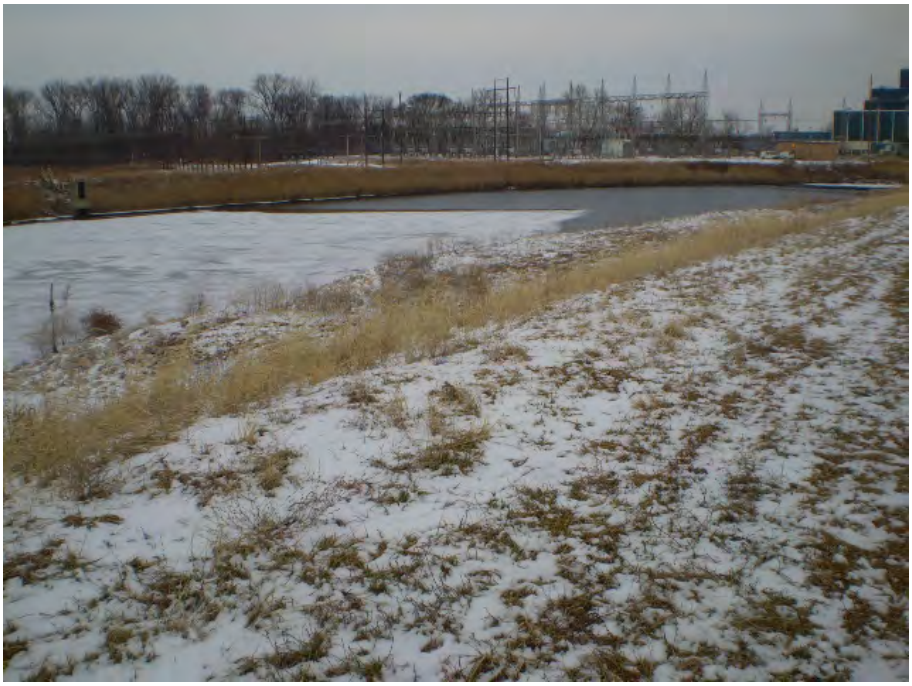

Photo 20: Settling Basin at North End of Pond 4

SCS COMMENTS ON AMEC DRAFT REPORT AND SITE CONDITIONS

1. The AMEC draft report is based upon a review of available historical records and AMEC's observations during the August 2010 site visit. AMEC references and considers IDNR, USACE, MSHA and EPA safety evaluation guidelines, although it is not explicitly stated which guidelines govern these ponds evaluation. While the various guidelines are reasonably similar in content, some differences do exist, but these differences were not addressed in the final recommendations. For example, AMEC applies the National Dam Safety Review Board condition assessment definitions in arriving at an overall "poor" rating for the ponds, yet no specific or quantifiable information was provided to justify this rating. Also, such a condition rating in not part of the EPA inspection forms that were completed in August 2010; the EPA inspection forms only address the hazard potential classification. Justification for utilizing the National Dam Safety Review condition ratings was not provided or documented as necessary for this evaluation

2. AMEC's "Low" Hazard Potential ranking for Ponds 1, 2 and 3 is reasonable and appropriate, but the "Significant" Hazard Potential for Pond 4 may not be justifiable from available information, as discussed in items 3, 4, 5 and 6 below:

3. Due to the historical stability of the ponds since their original construction, coupled with routine site inspections that have been undertaken by Hoosier Energy at least since 1996, or earlier, and regular maintenance activities that have been on-going, it is our considered opinion that additional stability modeling, slope monitoring, and use of ½ the PMP for rapid-drawdown stability at Pond 4, are not necessary at this time. Not only has Hoosier secured professional engineering design and technical support from several reputable consultants including HMSM, Santec, Burns & McDonnell, VATC, R.W. Beck and SCS Engineers, their written Preventative Maintenance Procedures CHE-001 (Quarterly Property Inspection), which dates back to 1996, covers specific check points for each of the four ponds, such as culverts, pumps, water levels, discharge points, erosion, ditches, signage, and river level.

4. With specific reference to Pond 4's "significant" hazard rating, AMEC indicated this was due to its "close proximity" to White River. An examination of aerial photographs and drawings, and January 2011 site visit, suggests that Pond 4, Pond 3 and Pond 2 are at relatively similar distances to White River, about 800 feet, more or less. Pond 1 appears to be closer, but it is difficult to measure the distance accurately. Further, AMEC's draft report does not explain or quantify the term "close proximity" in relation to the impact of a potential breach or failure of the ponds. Therefore, the significant hazard rating is not necessarily justified based on distance alone.

5. The AMEC draft report notes that the outer dike at Pond 4 (on the river side) was evaluated by a geotechnical engineer (FMSM) for slope stability, which included geotechnical borings and testing, and determined to be stable for seismic, static and rapid-

drawdown conditions. Given this detailed evaluation by a competent engineer, on-going maintenance activities, as well as the actual stable performance since the ponds were originally constructed (a period spanning up to 30 to 40 years), there is ample evidence to support a conclusion that the outer pond berms are stable under long-term, seismic and rapid-drawdown. Based in this evaluation, supplemental stability modeling would only be warranted if site conditions have changed since that time, or if new loadings are anticipated. It would have been appropriate for AMEC to discuss the previous history of stability in their assessment and consider in their recommendations. In our view, the ponds have been in operation for a long enough period of time, and experienced a wide enough range of loading conditions to provide confidence that stability will continue to be maintained in the future, with continued proper maintenance and operations by Hoosier Energy. This is not to say that unusual or extreme loading factors or highly localized geotechnical or seepage conditions might not contribute to erosion, seeps, or even breaches, as such conditions are difficult if not impossible to model and/or predict for any impoundment structure.

6. In general, we agree with AMEC that additional stability modeling, along with regular inspections and on-going maintenance and repairs to the embankments for erosion, seeps, surface sloughs, etc., will be beneficial in maintaining long term stability, but not due to any single known problem or defined deficiency. Our review of the geotechnical conditions and material stratigraphic conditions suggest that the circular failure surfaces analyzed in previous slope stability model provide reasonable approximations of likely potential shear surfaces and that analyzing block or wedge surfaces (non-circular) are unnecessary. Such modeling would be warranted only if a well-defined weak surface, or preferential slippage surface was identified.

7. With regard to monitoring, installation and monitoring of slope inclinometers and similar devices is not justified based on the site history and geotechnical conditions. Inclinometers are employed to measure deformation patterns and magnitudes below ground (or within a slope) in cases where below ground deformation is large, or failure potential is high, which is not the case here. Also, inclinometers are typically monitored on a monthly to quarterly basis (daily and weekly monitoring is expensive and only used in rare cases where instability is likely). Quarterly or monthly monitoring is not frequent enough to provide real-time information on potential slope deformation, or within a suitable timeframe to warrant the cost of equipment or personnel. Further, for the deformation information to be useful in assessing stability, specific quantifiable deformation criteria (e.g., inches and/or inches per day) would need to be established along with a plan to deal with deformations, which would require significant engineering evaluations to set the criteria. From a practical perspective, common plastic inclinometer casings tend to shear or deform below ground to the point that monitoring, even under normal conditions cannot be done. As a result, their useful life is often limited to few years, more or less. Stainless steel inclinometer tubing is available, but at very high cost.

8. With regard to utilizing ½ PMF for stability modeling at Pond 4, we do not believe evaluation of this condition is justified since it would apply only to the rapid-drawdown case, which was shown by previous stability modeling in 2007 to have a Factor of Safety of 1.4 for the 100-year storm. As the target factor of safety for rapid drawdown is 1.1 for this site, it is highly unlikely that the difference in water levels between ½ PMP and PMP would lower the factor of safety from 1.4 to 1.1, a decrease of more than the 27%. Since the ponds have operating safely and been stable for decades, under a variety of loading conditions, there is little justification using this issue as a rationale for a significant hazard rating.

9. AMEC's Conditions Assessment of "Poor" for all four ponds does not appear to be justified based on the information presented by AMEC and supporting documentation. The poor condition rating relates to "uncertainties" related to critical parameters which identify a potential safety deficiency, and is not necessarily linked to a known or anticipated problem condition. In our opinion, a "fair" conditions assessment is more than justified in this case. A fair assessment is defined as "no existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range of further action." This is especially the case for Pond 1, which is incised (built into the ground) and for Ponds 2 and 3 which would require fly ash to flow uphill during a failure to become a problem. Applying such a term as poor to the impoundments would likely be misunderstood by members of the lay public.

10. As the ponds have been in place for up to 3 to 4 decades, inspected regularly, maintained and evaluated for stability, and only Pond 3 experienced a breaching event (due to piping following excessive rain in 2007), historical evidence supports the conclusion that the ponds are stable in their current configuration and condition Based on this information, the ponds are likely to remain stable provided regular visual monitoring of the slopes, combined with pro-active maintenance (including removal of trees that are actually on constructed berms, erosion protection, limiting ponding, etc), and proper filling operations, are followed.

11. AMEC recommends applying hydraulic and hydrologic analysis following MSHA guidelines, as discussed above, for all critical stages of the pond life including full pond conditions. This particular recommendation exceeds the IDNR regulations which apply to dams with a drainage area exceeding 1 square mile, dam embankment greater than 20 feet, and impounding more than 100 acre-feet. Since the ponds do not collect stormwater from a larger watershed area, and only need to handle direct precipitation, hydraulic design evaluations of the type recommended do not appear warranted.

In summary, while it is generally prudent to evaluate pond design and performance by performing stability and hydraulic modeling for impoundment structures, along with regular inspections and maintenance, we do not feel that AMECs inspection report findings are necessarily supported by available information, including the historical stable performance of the

pond dikes. Specifically, the significant hazard condition ranking for Pond 4 and the poor condition rating for all four ponds are overly-conservative for the reasons noted above. Recommendations for the focused additional slope stability, hydraulic and hydrologic modeling, and sophisticated monitoring (i.e., inclinometers), to re-confirm pond stability and to protect the environment do not appear to be necessary to confirm stability. If such modeling and evaluations are ultimately undertaken by Hoosier Energy, they should be done out of an abundance of caution, or if operational conditions will be changing, and not as a stipulated regulatory requirement, or in response to AMECs draft inspection report to upgrade Hazard and Conditions rankings. Hoosier has clearly demonstrated a commitment to maintaining stable and safe operations, which should be considered in any type of safety evaluation.

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